

A PRACTICAL TREATISE
ON THE
NEW OPERATION
FOR
LATERAL CURVATURE
OF
THE SPINE.

Arn. What wilt thou do for me ?

Stran. Change

Shapes with you, if you will, since your's so irks you ;
Or form you to your wish in any shape.

Arn. Oh ! then you are indeed the demon, for
Nought else would wittingly wear mine.

Stran. I'll show thee
The brightest which the world ere bore, and give thee
Thy choice.

Arn. On what condition ?

Stran. There's a question !

* * * * *

Arn. Had no Power presented me
The possibility of change, I would
Have done the best which Spirit may, to make
Its way, with all Deformity's dull, deadly,
Discouraging weight upon me.

DEFORMED TRANSFORMED.

In. 1338.

A

Cur

PRACTICAL TREATISE
ON THE
NEW OPERATION
FOR
LATERAL CURVATURE
OF
THE SPINE.

SHOWING THOSE CASES IN WHICH ALONE THE OPERATION
IS ADMISSIBLE.



With Plates.

BY G. B. CHILDS, M.R.C.S.

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P R E F A C E.

HAVING, in a work which I published in the month of April last, endeavoured to point out the nature, causes, and treatment of that condition of spinal deformity dependent on a general debility of the dorsal muscles, my present object is to direct attention to another very fruitful source of these affections, and to explain the nature of a *new operation*, which has been practised with signal success on the continent, and lately by myself in this metropolis.

Since publishing the work alluded to, considerable time has been occupied in pursuing the treatment of these affections; any additional views therefore advanced in the following pages are the result of the experience thus afforded me.

I have been anxious to convey a right conception of the description of curvatures suitable for operation, by drawings illustrative of some of the cases in which I have operated.

It will be requisite perhaps to offer an explanation of what to some may appear an anatomical error, or rather an omission. In speaking of the muscles, I have alluded only to those which are the chief agents in the mischief, although others of less importance are involved.

In conclusion, I have only to add, that should the following pages have the effect of directing attention to this important branch of surgery, and of removing a prejudice which the public naturally feel towards any operation, however trivial, my anxiety and trouble will be amply repaid.

G. B. CHILDS.

WOOD STREET, CHEAPSIDE.

THE NEW OPERATION

FOR

LATERAL CURVATURE OF THE SPINE.

THE *spinal column*, situated along the posterior part of the trunk, is composed of twenty-four bones, called *vertebræ*. Each bone gradually increases in size from above downwards, representing a pyramid, with its base below and its apex above.

Between each of these bones is placed an elastic, fibro-cartilaginous, or *gristly* substance, acting as a sort of cushion, which, yielding to pressure, recovers its form, thus favouring the extent of motion, and assisting to prevent displacement.

The spinal column, for the sake of anatomical accuracy, has been divided into three regions,—cervical, dorsal, and lumbar. Each region varies in the number of *vertebræ* it contains: thus, the cervical region contains seven *vertebræ*, the dorsal region twelve *vertebræ*, and

the lumbar region five vertebræ. In general it is about one-third of the whole length of the body, and is nearly the same in all individuals, except when it suffers displacement. It naturally represents a curve in three different directions: in the cervical region it is concave posteriorly, convex in the dorsal, and again concave at the loins. By this arrangement it must appear that any weight superimposed upon the apex of this moveable pyramid must necessarily tend to increase the natural inclination of the spine, and to bend it forwards; but this is obviated by the resistance afforded by the contractions of the muscles at the back of the neck, which, deriving their origin from the spine itself, are inserted into the occiput, or back part of the head. During sleep this resistance is lost, and consequently the head droops.

The powerful weight of the thoracic and abdominal viscera, which are attached along the anterior part of the spine, produces moreover a tendency in the body to fall forwards, were it not prevented by the action of two powerful muscles situated along the posterior part of the trunk, and which, as they occupy a most conspicuous position in the affection under our present notice, require further consideration.

The sacro-costalis and longissimus dorsi are two powerful muscles, which fill the whole interspace that exists between the sacrum and last rib; they are so intimately

blended and incorporated with each other below, as to have the appearance of one large muscle, covered by and adhering firmly to a strong dense thick aponeurosis, of a white and glistening appearance, having in itself scarcely any trace of elasticity. This aponeurosis is attached to the posterior part of the iliac crest, to the spinous processes of all the lumbar and last dorsal vertebræ, and the middle ridge of the sacrum. From this aponeurosis these muscles derive a greater portion of their origin from one common mass, the fibres of which ascend vertically upwards, and then separate into two divisions; one of which, bearing the name of the sacro-lumbalis, but more properly the sacro-costalis, is directed somewhat obliquely upwards and outwards, and goes to be inserted, by means of six or seven flat tendons, below the angles of the six or seven last ribs. The other division, the longissimus dorsi, ascends along the side of the vertebral column, terminating in a point, sometimes sending a long thin tendon to be inserted into the head. As it ascends, this muscle divides into a number of fleshy tongues, forming two distinct rows,—one external, the other internal. The external are the thinner of the two, and consist of seven or eight in number, which are attached to the under surfaces of as many ribs, near to their articulation with the transverse processes of the vertebræ; the internal are much stronger, and are attached to twelve of the transverse processes themselves.

These two muscles, acting in conjunction with their fellows on the opposite side, assist in preserving the spine erect, in counteracting the weight of the abdominal and thoracic viscera applied along its anterior part, and in producing flexion and extension of the spinal column.

For the due performance of all the functions assigned it by Nature, it is requisite the spinal column should represent great firmness and strength, and yet at the same time be so flexible as to allow of motion in every direction. The amount of flexibility which the spine possesses is very considerable, and the extent to which this may be brought by cultivation is exemplified by the grotesque shapes and attitudes assumed by posturers and tumblers.

For this degree of flexibility it is dependent on the intervertebral substance or fibro-cartilage already alluded to, which, being placed between the articulating surfaces of the vertebræ, yields to pressure in all directions, exhibiting the same arrangement as a bladder filled with water placed between two flat plates. By approximating the circumference of these plates on one side, a portion of the water is displaced, and instantly occupies the space occasioned by the removal of the pressure from the opposite one.

The vertebral column does not possess an equal degree of flexibility throughout its whole extent; it varies considerably in its different regions: thus, in the cervical region every thing is so arranged as to allow the neck

freedom of motion in every direction,—forwards, backwards, and from side to side, together with a rotatory movement of one bone upon the other. In the dorsal region the articulating surfaces of the vertebræ are arranged in such a manner that the possibility of motion is in a great measure prevented. The object of this arrangement will be apparent, when we consider that this region of the back affords a firm attachment for the heart and respiratory organs, as also a fixed support for the ribs to play on during the act of respiration. Had Nature ordained it otherwise, and made this moveable, our lives would have been in continual jeopardy, from the evil consequences which must arise from the constant and sudden displacement of the thoracic viscera.

It is in the lumbar region that the greatest power of flexibility is perceived: the intervertebral substances in this region gradually increase in thickness from above downwards; and, were it not for the support afforded by the immense mass of muscles situated in the loins, the spine could not be preserved in the erect attitude, but be continually swayed backwards and forwards, and from side to side. As it is, Nature has restricted these movements, and, by the addition of these muscles, afforded every requisite degree of support.

Such is the spine in its normal condition, and such are the admirable functions it is ordained to fulfil; but, like all other parts of the body, it is liable to derangement,

to have its functions impaired, and be rendered, if not totally, yet in a great measure unfit to obey the important ends which Nature has assigned it.

Surely, out of the numerous maladies which afflict mankind, there cannot be found any whose claims are more urgent, or deserve more the peculiar attention of medical men, than those which affect and destroy the beauty and symmetry of the human form. There can be no doubt that physical defects, in a majority of instances, exercise a powerful and lasting influence over the moral faculties.

To any abnormal deviation of the vertebræ from the straight line of the back we are accustomed to apply the term *spinal distortion*; and as these bones are liable to displacement in every direction, we are enabled to distinguish different varieties of curvature, and to designate them by such names as will enable us to convey a right conception of each. Thus, we may have curvature forwards, or incurvation of the spine; curvature backwards, or excurvation of the spine; and curvature laterally, or lateral curvature of the spine. It not unfrequently happens that we meet with these two latter blended together, the curve taking an intermediate direction; to this variety I propose applying the term *postero-lateral*.

LATERAL CURVATURE OF THE SPINE.

Having in a previous work expressed some general views respecting the nature, causes, and treatment of this affection, I now propose confining myself exclusively to those descriptions of curvatures in which the operation is alone admissible; and for this purpose, in order to simplify our views, and render these cases as clear as possible, I shall arrange them under two distinct heads.

First,—Those which are primarily and fundamentally dependent on increased muscular developement.

Secondly,—Those in which the muscles are but passive agents in retaining the spine in its abnormal situation.

Under the first head is included that description of curvature, which has for its origin an increased activity of the trapezius and rhomboid muscles; the antagonizing power of those on the opposite side being overcome, the spine yields to this unequal power, and is gradually and forcibly drawn in a lateral direction.

This description of curvature is induced by various causes, and is most frequent amongst mechanics, and those whose occupations in life require a frequent and

long-continued action of the muscles on one side : thus, printers and bookbinders are peculiarly liable to it from the daily occupation of pulling at the press, an employment which requires great muscular power.

Many of the common acts of life have a tendency to produce this curve, by exciting, in a slow and gradual manner, an unequal developement of muscular power. Young ladies who have been long confined to one particular accomplishment, are frequently affected with it ; thus, guitar-playing, harp-playing, piano-playing, the frequent and long continued acts of writing and drawing, may be all enumerated amongst the most frequent causes of this complaint. On no one subject has the pen of the medical writer been more powerfully directed than against the evil consequences which ensue from the abuse of stays ; it forms a most powerful link in the chain of causes which induce this disease, and should not therefore be regarded as unimportant.

The most learned surgeons and anatomists have not considered this subject beneath their notice. Scæmmering has devoted a considerable portion of his valuable work to the subject ; and Camper, a celebrated Dutch anatomist, particularly dwells on the evil effects arising from the employment of the inelastic, unyielding stays, that were in use in his time in Holland. In our own time, Mr. Coulson and others have dwelt largely on the subject.

A well-known effect of the use of stays is, that the right shoulder frequently becomes larger than the left ; because the former, being stronger and more frequently in use, somewhat frees itself, and acquires by these means an increase of power, of which the left side is deprived, by being feeble and subjected to continual pressure.

I frequently meet with this increased developement of the trapezius and rhomboid muscles amongst children from the age of twelve to fourteen, with whom none of the circumstances above mentioned are applicable ; I am therefore quite at a loss to account for it, unless it be from the habitual practice of using more frequently the muscles of one side.

In all these cases the curvature is generally confined to the vertebræ situated between the last cervical and the fifth or sixth dorsal. The existence of a second curve below this, in the opposite direction, is not a necessary consequence ; nor, in fact, is it a general result ; for as long as the sacro-costalis and longissimus dorsi muscles on either side retain their natural powers of action, no displacement of the lumbar vertebræ will ensue ; and, indeed it not unfrequently happens that these muscles, on the side in which the dorsal convexity is seen, acquire a considerable increase of bulk and power, thus assisting most materially to counteract the tendency to any further deviation of the spinal column.

Should the power of these muscles, however, be not

sufficiently adequate to fulfil these indications, a marked difference will be observed in the state of the back, and Nature, in her endeavours to restore the lost equilibrium of the body, induces another curve in the loins, the spine assuming somewhat the character of the Greek ζ (zeta).

The sacro-costalis and longissimus dorsi muscles on the opposite side have now nearly the whole burthen of supporting the trunk, and on them devolves the duty of flexion and extension of the spine. These muscles consequently undergo an increase of action; and although in the earlier stage they had no effect whatever in inducing the curve, yet they now become powerful agents in increasing the deformity, and in rendering every attempt abortive to reduce the spinal column to its original and natural situation.

From the foregoing observations, I wish it to be understood, that although the proximate cause of this description of curve is primarily and fundamentally dependent on an increased action of the trapezius and rhomboid muscles, yet as the process of distortion advances another class of muscles become involved, which accelerate in a material manner the progress of distortion.

On examining the back, in the commencement of this affection, we find an appreciable enlargement of the trapezius and rhomboid muscles on the side corresponding with the convexity of the curve; the right

shoulder will be somewhat elevated above its fellow—the muscles firm and unyielding to the touch; and it not unfrequently happens that the patient complains of a burning or pricking sensation in them.

The ribs may, or may not, have suffered displacement; if such is the case, they are generally directed backwards and downwards, from half an inch to two inches and a half. This projection takes place at their angles, their sides being flattened, and their cartilaginous extremities tilted up, forming a projection in front of the abdomen. On directing the patient to bend forward, the sacro-costalis muscle of the same side will sometimes be seen, passing like a tense cord from its origin to its insertion.

The opposite side will become contracted and diminished, the functions of the heart and lungs impaired, and the chest twisted. From the approximation or contact of one rib with the other on the concave side of the curve, the intercostal muscles are shortened, and in some cases absorbed, and converted into tendinous structure.

A striking contrast will be exhibited between the muscles of both sides; those on the concave side are so diminished in bulk, that they scarcely bear any trace of their original substance.

A marked difference to this, however, occurs, when the disease has so far advanced as to induce a second curve at the loins, as before observed; the muscles in

this region then assume an increase of action, and are found considerably enlarged.

I am not aware that any allusion has been made, by those who have written on spinal deformity, to this atrophied condition of the muscles on the concave side of the curve, any further than as a result of their passive or inactive state. I cannot concur with those who attribute it *solely* to a want of balance between the natural functions of the antagonizing muscles, and I feel assured some other cause exists which actively co-operates in lessening their powers of contraction, and in occasioning so considerable a diminution of muscular substance.

In searching for this other cause, our minds are naturally directed to the results which necessarily ensue from the want of a free supply of nervous energy to any muscle, or set of muscles. From physiological investigation it has been found, that the amount of contractile power inherent in muscles is precisely in an inverse ratio to the number and size of the nerves which enter them. Small muscles have but a single branch, but those of large size are penetrated by several at once. Should, therefore, any circumstance arise rendering the functions of these nerves imperfect, a sensible diminution and change will be observed in the vitality of organs. The blood, which contains most of the principles necessary to nutrition, circulates but feebly; the calibres of the larger arteries become contracted, and many of the lesser ones obliterated.

There is an evident relation between the action of the nutrition of an organ and the blood it receives in a given time : the tissues that have rapid nutrition have larger arteries.

On examining the state of the back of a patient affected with lateral curvature, we are often led to form abrupt conclusions, without duly reflecting on the pathological condition of the parts involved in the mischief.

The whole mass of muscle situated along the posterior part of the trunk derive their chief supply of vital energy from the nerves and vessels which pass between the transverse processes of the vertebræ. Since, then, these bones on the concave side of the curve suffer so decided a change in their relative positions, having their transverse processes brought into more immediate contact with each other, is it unreasonable to infer, that the natural functions of the dorsal nerves and vessels are but imperfectly performed, and that a considerable loss of muscular energy is the consequence ?

Primary Seat of Lateral Curvature of the Spine.—A great discrepancy of opinion exists amongst medical authorities respecting the primary seat of lateral curvature ; some contending that it always commences in the loins, and that the curve in the dorsal region is merely consecutive to this ; whilst others, again, have advanced quite an opposite opinion. Many ingenious arguments have been advanced in support of both doctrines ; but as

arguments are but vague fallacies when opposed to the more palpable evidence adduced from facts, we should not allow ourselves to be too easily persuaded, but examine attentively, and without prejudice, each case as it appears before us.

Amongst the advocates of the former doctrine we find many intelligent surgeons, who, one would suppose, have had numberless opportunities of investigating the subject. Mr. Shaw, a gentleman who has greatly enriched this part of surgical science by a valuable work on deformity of the spinal column, has adopted these views, and offered many ingenious explanations in favour of them.

Although I would not presume to place myself in the field against such powerful opponents, shielded only by the weak protection afforded me by *argument*, yet I must confess my experience thus far, has led me to a different conclusion, and to regard the dorsal curve as the first which is formed.

In numerous examples of incipient lateral curvature under my treatment at present, I am not able to detect the slightest trace of curvature in the lower portion of the back, whilst the dorsal is too evident to be overlooked. Whether my examinations have been but carelessly made, or my powers of perception are less acute than others, experience alone can determine: of the former charge I shall find it a difficult matter to prove myself guilty.

On referring to cases which came under my notice two years since, and by a recent examination of the patients themselves, I am still more disposed to regard Mr. Shaw's views as erroneous; for curvatures which at that time were evidently situated in the upper portion of the back, without any trace of lumbar curvature, have, by neglect, gradually induced this latter.

The two following cases, which I have selected, may serve to illustrate my views on this subject:—

MISS MATILDA W——, aged 13, has been under my care two months, affected with incipient lateral curvature of the spine. On examining the back, the spine was seen to take a lateral direction towards the right side, involving the four or five superior dorsal vertebræ. The trapezius and rhomboid muscles of the same side were much enlarged, and were firm and rigid to the touch; the inferior angle of the scapula projected considerably beyond its natural situation; and the whole of the right side of the neck was fuller than ordinary. The ribs had not suffered displacement on either side; they retained their normal situations. The trapezius and rhomboid muscles on the concave side of the curve were much diminished in bulk, and were quite soft and compressible. Her breathing was not affected, nor had she suffered from ill health; a pricking sensation was occasionally felt in the muscles of the right shoulder. A second curve could be traced in the opposite direction, commencing

about the centre of the back ; the longissimus dorsi was seen slightly elevated above the spinous processes of the vertebræ, forming a ridge along the course of the spine : no unusual appearances were exhibited by these muscles on the opposite side. Neither of the hips projected ; nor, when dressed, was there much deformity apparent.

From the history I have had of the case from the young lady's friends, I find that symptoms of deformity began to shew themselves about three years since, when at boarding-school, by an enlargement of the right shoulder. This did not attract much attention at first ; and it was not until curvature was discovered, that her friends began to think seriously about having advice on the subject. The curvature below was progressive in its approach, and was not seen until some time after the dorsal curve.

Since this young lady has been under my care, there has been a gradual amendment in the state of the back, and the spine is now much straighter.

MISS C——, of Kingsland Road, aged 15 years, applied to me March 1839, labouring under lateral curvature of the spine. On examination, I found the right shoulder considerably elevated above its fellow ; the base of the left scapula much depressed, and drawn towards the mesial line. The curvature extended from the last cervical to the fifth or sixth dorsal vertebra ; the intermediate vertebræ being so far removed from their

natural position as to be almost situated beneath the base of the right scapula, thus projecting it to a great extent, and giving the appearance of an immense tumour or swelling occupying this portion of the back. This was so perceptible, that, when dressed, it occasioned a great deformity. She complained of no pain in any part of the back. The sternum was slightly twisted, and the ribs directed backwards; the functions of respiration were perfectly performed; constitution rather weak, and susceptible of colds. On drawing a straight line from the commencement of the curve along the middle of the back, and directing her to bend forward, I found the curve was considerably diminished;—locomotive organs perfectly healthy.

During the time this young lady was under my care, by keeping in the prone position, using friction and well-regulated forms of exercise, the curve sensibly diminished.

In consequence of a domestic affliction, my attendance was discontinued. I was sent for again about a month since, her friends being anxious to consult me on the new operation I had performed. On examining the back, I found a great change had taken place: the original curve was much diminished in extent, but another had commenced on the left side; the left longissimus dorsi was enormously enlarged, and formed an elevated ridge along the whole course of the spine.

From the history I have had of this case it appears, that the first symptom of deformity was observed when the young lady was about seven years old, by an enlargement of the right shoulder, and a continual habit of drawing it over the top of the frock. She was, after this, sent to boarding-school, where, from a close application to her studies, and an inattention to her figure, she gradually got worse.

Mr. Coulson, a gentleman who has had considerable experience in the treatment of lateral curvature, has ably discussed the subject as to the primary seat of this affection; and as his views will materially assist me in rendering this matter clear, I shall introduce them here.*

“ ‘ In consequence,’ says Mr. Shaw, ‘ of the alteration in the state of the shoulders being the first symptom of deformity observed, it is generally, but erroneously, supposed that the dorsal part of the spine is the first distorted; indeed, those who have lately written on this subject have fallen into this error, and have described the curve at the loins as the last which is formed.’

“ I shall endeavour,” observes Mr. Coulson, “ to shew that they were right in this, though they did not clearly see the cause.”

“ ‘ In cases of diseased vertebræ there may be a curve

* Vide “ Coulson on the Chest and Spine,” page 278.

only between the shoulders; but it invariably happens, in the common lateral curvature, that where one shoulder is protruded, there is also a curve at the loins; and I have shown by diagrams in the preceding volumes, that this curve is not only the first formed, but that those in the upper part of the spine are consequent upon it.'

" That is to say, Mr. Shaw has shown this hypothetically, while his own practical observations, in spite of his hypothesis, tend to prove that the first curve is formed at the right shoulder.

" A circumstance not less decisive establishes this, namely, that in seven cases out of eight the curvature between the shoulders is towards the right side. Now, for this, the excessive action of the right arm can alone account; and consequently it is there only that the first curve can be formed.

" ' When the practitioner, under the idea that the dorsal part is the first affected, directs his attention principally to it, he is apt to neglect the root of the evil; for as the upper curves are the consequence of the lower, it almost necessarily follows, that if the lumbar part can be made straight, the dorsal and cervical vertebræ must also become so; if they did not, the head would be carried to one side.'

" Mr. Shaw here takes for granted what has been just shown to be untrue. But there can be no doubt, that

the correction of any one spinal curve will tend to rectify the rest.

“ ‘ By taking this view of the formation of distortion, I was led to attend more to the means of remedying the curve at the loins than at the shoulders ; and I have found by experience that I was practically right, for the only instances where the amendment of the curve between the shoulders has not followed the removal of the bend at the loins have been where the upper ribs were much mis-shaped, or where ankylosis had taken place between two or three of the dorsal vertebræ ; but even in those cases the curve which remained between the shoulders has been so short and so acute as to have little effect on the general figure.’

“ ‘ I have just said, that the correction of any one of the spinal curves will tend to rectify the rest ; for if the lumbar *necessarily* accompanies the dorsal curve, it follows that the latter will as necessarily disappear with the former. Still, however, it is evident that common sense would direct preferably the removal of the curve first formed, or rather the removal of the causes which form it in the excessive employment of the right arm.

“ ‘ It is the curve at the loins, much more than that higher up, which gives the peculiar appearance to girls who are distorted ; for as this curve is near the base of the column it shows all the parts above out of their natural line, and also affects the motions of the legs, as

the great muscles which rotate and move the thighs forwards arise from this part of the spine.'

" That the lower curve as directly affects the motions of the lower extremities as the upper curve affects the motions of the upper extremities, proves nothing as to the prior formation of either, and is not therefore to the present purpose.

" " I suspect that too much importance has been attached to the position of the shoulders as a cause of lateral distortion. The more I see of this serpentine curvature of the spine, the more I am convinced that although the distortion will be always much increased, and occasionally produced by certain positions, it is generally caused in the first instance by the yielding of the lumbar portion of the spine to the superincumbent weight.'

" It is a suitable close of such illogical argument, that Mr. Shaw only " suspects " that the position of the shoulders is a cause of little importance in the production of lateral distortion, and that he assures the reader of his conviction on the subject. Both the facts he himself has stated, as to the position of the shoulder in standing, writing, and lying in bed, and the circumstance that, in seven cases out of eight, the curvature between the shoulders is towards the right side, prove that the wrong position of the right shoulder is the great cause of this universal deformity."

Under this division of our subject is the case of John Henry Knock, on whom the operation was performed, for the first time in this country.

This case excited considerable interest both amongst the profession and the public, having been taken notice of by many of the principal journals. The following are the particulars of the case, which I published in the Medical Gazette of November the 20th :—

“ The subject of operation was a lad 17 years of age, who had been affected with lateral curvature of the spine three years.

“ His business was that of a printer, in which occupation he was daily employed in pulling the press, whereby he was in the habit of putting into excessive action, the latissimus dorsi, trapezius, and rhomboid muscles of the right side, whilst those on the opposite were comparatively inactive ; the consequence of this was, that in six months after his apprenticeship to the business, he began to feel an uneasiness, and, as, he describes it, a burning sensation in the upper and right side of the back : this was shortly after followed by an enlargement of the right shoulder, and a lateral curvature in the dorsal region. This continued to increase, so that when he applied to me, about eight months since, the deformity was very striking.

“ On examining the back, I found the deviation to extend from the last cervical to about the sixth dorsal

vertebra: below this the vertebræ suffered no displacement, but occupied precisely the mesial line of the back—a circumstance unusual in a case of so long standing.

“ The right shoulder was considerably elevated above its fellow, with a corresponding displacement of the clavicle; but there was no excurvation of the ribs: on either side they retained their natural situations.

“ The rhomboid and trapezius muscles were greatly enlarged, and, by bringing the fore-arm across the chest, were so stretched that a finger could easily be passed beneath the rhomboideus major. The muscles on the left side were so diminished in bulk that they could scarcely be traced.

“ His general health had been good, with the exception of suffering occasionally from enlarged cervical glands. As his means would not allow him to adopt my regular course of treatment for these affections, I recommended him to keep as much as possible in the prone position, to use my extension apparatus, and to employ certain forms of exercise.

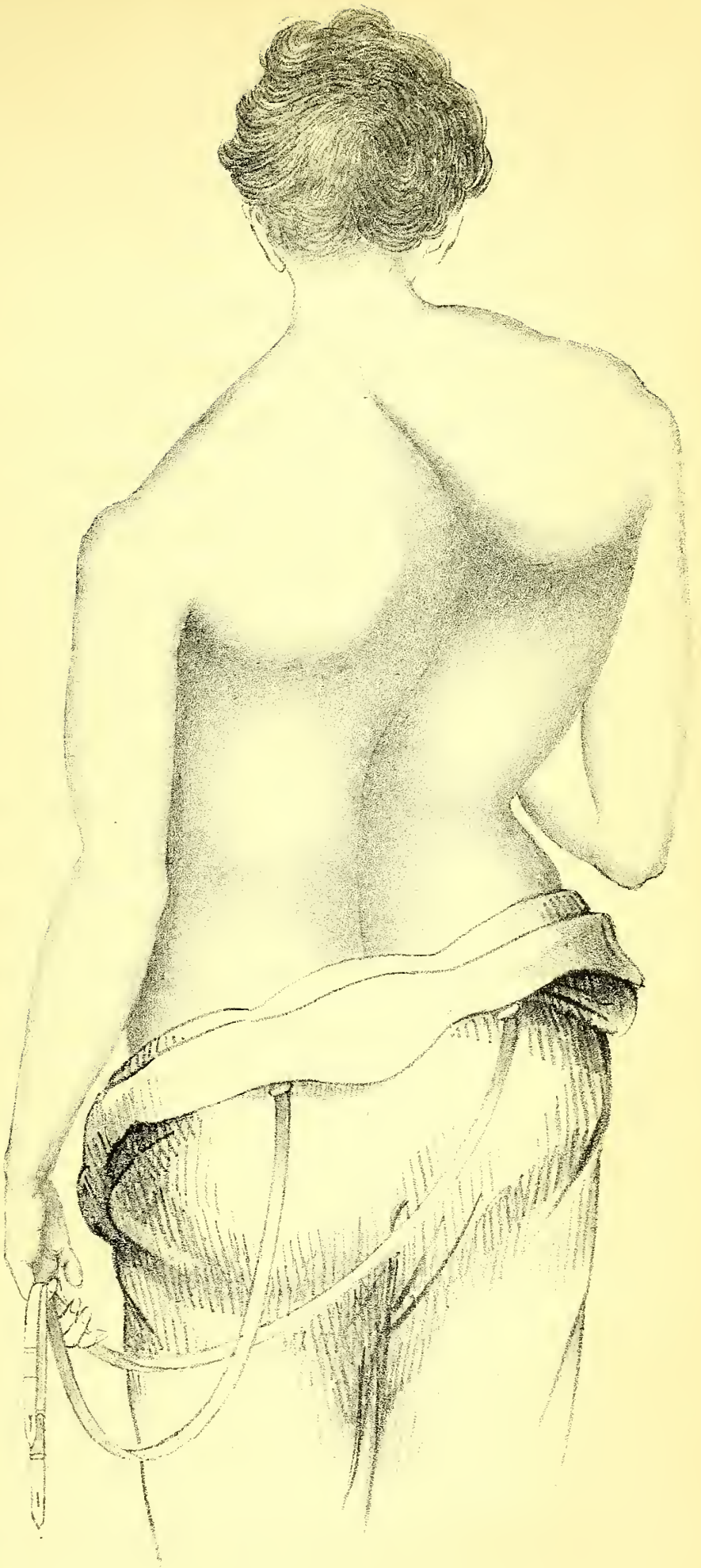
“ In consequence of the nature of his employment, he was prevented from pursuing this course with the regularity wished, and the right arm was daily occupied in pulling the press. I lost sight of him until last week, when he again applied to me; and, not finding the slightest improvement in the state of his back, I ex-

plained to him the nature of an operation which had been performed by M. Guérin, in Paris, and lately by Dr. Hunter of Glasgow, and recommended him to undergo it, as the only probable means of effecting a cure ; and without hesitation he assented.

“ The patient being placed in the prone position, with the chest considerably elevated, and the head hanging over the table, Mr. Coulson produced tension of the muscles on the concave side of the curve, by drawing the left arm forwards, whilst Mr. White, by raising the right shoulder upwards and outwards, kept the rhomboid and trapezius on the stretch. I then introduced my knife (which was about four inches in length, and the eighth of an inch in breadth) as close to the ribs as possible, midway between the inferior angle of the scapula and the spinal column, and carried it upwards as far as its superior angle : I then withdrew the knife, bringing its cutting edge in contact with the anterior surface of the muscles, and as close as possible to the integuments without wounding them, and in this way completed the operation, which occupied less than a minute.”

The annexed plate is a correct representation of the state of the back prior to the operation.

In the same publication, of December 25th, will be found a plain and unexaggerated statement of the result of this operation, as well as the particulars of other cases



CASE OF JOHN HENRY KNOCK A

From life and on Stone by R C Bridges

Printed by W. Lake Litho 50 Old Bailey

which had undergone operation, and of which I shall speak hereafter :—

“ The result of the operation above alluded to has in every respect realized my most sanguine expectations. The spine, which previous to the operation suffered deviation of at least three inches from the mesial line of the back, involving the six superior dorsal vertebræ, is now reduced to within half an inch of its natural situation ; the right shoulder has fallen on a line with its fellow ; and the muscles on the *concave* side have acquired a considerable increase in bulk. The breathing, which before the operation was difficult and impeded, is now perfectly free—the chest expanded, and nearly restored to its natural shape.

“ Amongst the changes that have taken place in the state of the back, the sacro-costalis and longissimus dorsi muscles on the *concave* side of the curve, which before were scarcely perceptible, can now, without difficulty, be traced from their origin to their insertions, evidently shewing an increase of activity and a corresponding developement of muscular structure.”

The following is an ungarnished statement from the patient himself :—

“ It is with pleasure I embrace the present opportunity of returning you my thanks for the great benefit I feel from the effects of your operation. Although gratitude prompted this before, yet on con-

sideration I thought it best to wait until I could speak with candour of the beneficial results from your skill and knowledge of my complaint. My friends congratulate me on the improvement of my spine; and as to myself, the absence of the many pains I used to feel, also the free breathing I experience, all confirm me, that, through the blessing of the Almighty, it is to you alone I should feel grateful for what I am at present. Wishing all who are similarly afflicted would undergo the same trifling pain, and feel the reward of it afterwards, I remain, &c.”

We come now to speak of those curvatures of the spine which are included under the second division of our subject, namely, those in which the sacro-costalis and longissimus dorsi muscles are but passive agents in opposing a restoration of the spinal column to its original situation. The proximate cause of this variety of spinal distortion is a gradual yielding of the vertebræ in a lateral direction, induced by superincumbent pressure. The remote causes are — first, debility of the spinal muscles; second, the continued application of artificial weight; and third, certain bad habits, acquired either in the sitting or standing posture, occasioning a loss of the natural balance of the body.

In speaking of the arrangement of the spinal column, it has been already shown, that its powers of flexion

are great, and that it is capable of moving in every direction.

A lateral inclination being given to the trunk, the intervertebral substance becomes compressed on the side to which the body is bent; but immediately the natural balance of the body is restored, and the trunk regains its perpendicular attitude, this pressure is removed, and its elasticity returns. So long as the natural functions of this substance are not over-tasked, or, in other words, so long as this pressure is temporary and repeated only at certain intervals, no evil results will ensue; but let it be of continual occurrence, and protracted in its duration, and a partial absorption of the intervertebral substance will take place. For this partial loss of interposing substance, nature accommodates herself, and derives support from the superincumbent weight, by a closer approximation of the vertebræ on the affected side, and thus is laid the basis of that description of curvature of which we now treat.

This kind of curvature is of frequent occurrence, and is often met with amongst young children and delicate females, in whom the contractile powers of the dorsal and lumbar muscles are inadequate to support the superincumbent weight of the head and shoulders.

The direction of the curvature is a matter in which no general principles are involved, as it is as frequently

directed towards the left side as the right; if any difference exists, the former is the most frequent amongst children.

In incipient cases, the general symptoms are not so strongly marked as in those which come under the first division of our subject, and it is not until the distortion has acquired some progress, that our attention is directed to the state of the back.

The symptoms which attract attention are, first, an inability to preserve the spine erect, which is more perceptible towards night; second, a gradual inclination of the trunk to one side; third, a sinking or hollowness of the same side, with a slight projection of the hip, and a corresponding depression of the shoulder above.

On examining the spine, a curve will be seen situated about the centre of the back, which assumes much the appearance of a bent hoop, and which is rendered more apparent by any effort made by the patient to gain the erect attitude. This curve extends from about the fourth to the last dorsal vertebræ. The ribs invariably suffer displacement; but this is mostly confined to the lower, which on the convex side become rounded and prominent, and are brought close to the brim of the pelvis.

As the curvature increases, the symptoms of deformity become more and more apparent, and a new and more formidable set of symptoms supervene. The lumbar

vertebræ now become curved in an opposite direction ; the pelvis becomes twisted, the hips projected, and the shoulder and collar bone of one side depressed. The false ribs approach the brim of the pelvis, leaving only a small space between them, and in some cases they are in actual contact ; the head and chin appear sunk on the chest ; and the gait of the young person becomes awkward, shuffling, and irregular. The functions of the heart and lungs become deranged ; dyspnœa, cough, quick breathing, and palpitations daily distress the patient ; in fact, this latter affection is so urgent, as to be frequently mistaken and treated for a disease of the heart itself.

All these may be referred to the contracted and diminished capacity of the chest, as well as the altered position of the viscera, which, from their firm attachments to the dorsal vertebræ, are forcibly dragged from their natural position in the course of the curve.

It is of importance, prior to an operation, that we entertain clear and distinct views on every subject connected with spinal distortion ; otherwise we incur great risk, of bringing into disrepute, not only ourselves, but one of the most important, and, if rightly applied, useful operations in surgery.

In speaking therefore of the *convex* side of the curve, I mean that side towards which the *dorsal* vertebræ project. These being the primary seat of curvature, I

prefer adopting this arrangement. It will be remembered, however, that when the lumbar vertebræ have suffered displacement, the muscles are *concave* with respect to this region.

The condition of the lumbar muscles in this kind of curvature is oftentimes very deceptive. In some cases we shall find the sacro-costalis and longissimus dorsi muscles enormously enlarged on the *concave* side of the curve, whilst in others again scarcely any trace of these muscles exists.

When this is the case, it may be established as a general rule, that little or no displacement of the lumbar vertebræ has taken place, and that this enlargement is consequent only on the augmented duties of these muscles, being the remedy resorted to by Nature for the prevention of any further deviation of the spinal column.*

Whatever be the appearances presented by these muscles, there is one condition of them *always* present, namely, a shortening of the sacro-costalis and longissimus dorsi from their origin to the convexity of the curve. By attentive examination the former muscle will be observed passing like a tense cord from its origin to its insertion, evidently a passive but powerful agent in retaining the spine in its abnormal situation, and in counteracting every effort to reduce it to a straight line.

* Vide the case of George Cook.

Amongst the class of patients who are *embonpoint*, this condition of the muscles is somewhat difficult of detection; and it is not until the most careful manipulation has been made, their contraction is discovered.

In order to render this subject still more intelligible, we must once more have recourse to the laws which govern muscular contraction.

“ The contraction of the voluntary muscles is either active or passive;—active, in obedience to volition, the laws of association, and to stimuli; passive, as when the arms, legs, or body are bent mechanically during sleep, or the delirium of fever, when the mind is not conscious of it.

“ During every state of contraction a muscle is shortened, and the force of contraction must be in the ratio of the length of a muscle, of the velocity of its contraction, and the quantum of space through which it can contract; and the power or strength of a muscle is in the ratio of its length and thickness combined. Muscles of equal length and density may differ in their capacity of contraction, if situated in different parts, some contracting to a shorter compass or space than others; but by the law of nature there is a fixed point of contraction allotted to all, at which they must cease, or their attachment must break. From which premises it may be deduced, that if a muscle

be permanently bent or contracted to one half or any portion of the space to which its capacity of contraction extends, it must lose all the power that length of contraction exerted and possessed."

The above being granted, we are led to infer, that as the power of contraction possessed by muscles is in the ratio of the length of their fibres, the closer their points of attachment approximate to each other, the more feeble will be their action, and, by a continued application of the approximating force, they become less and less effective in their operation, and at length, having undergone derangement of structure, become permanently shortened.

This is precisely what takes place in the muscles under our present notice. By the lateral curvature which the spine takes, the sacro-costalis and longissimus dorsi, below the convexity of the curve, have their sphere of action diminished by an approximation of their points of attachment; in consequence of this there is a relaxation of their muscular fibre, which becomes more and more decisive the further the spine is removed from its natural situation; the muscles being now rendered inactive, undergo a derangement of structure, and a permanent shortening is the result.

We will now proceed to speak of the remote causes of this affection, and in accordance with our previous arrangement.

First, *Debility of the Spinal Muscles*.—The spinal muscles partaking the same structure with all the other muscles in the body, are, like them, equally liable to debility and loss of power; and, in fact, this is a most common occurrence. Whether this debility be congenital or acquired, the resulting effects are the same; namely, a yielding of the spine to the superincumbent weight of the head and shoulders.

As this sometimes commences at an age when the little patients have not acquired the power of utterance, or making known their wants to those around, there are no symptoms, either common or peculiar, which will enable us to detect its existence; and it is not until the nurse or attendant, whilst washing or dressing the child, accidentally discovers an alteration, that our attention is at all called to the state of the back. Should it have arisen at a more advanced age, a sensation of weakness along the course of the spine will be the first indication of the disorder, and an incapacity to preserve the spine erect for any length of time, which becomes more perceptible towards night. As it progresses, this feeling becomes more and more distressing, until at length the patient finds it difficult to preserve the spinal muscles in a state of contraction longer than a few minutes; an inclination of the trunk takes place to one side or other; and a gradual displacement of the vertebræ to the opposite side ensues.

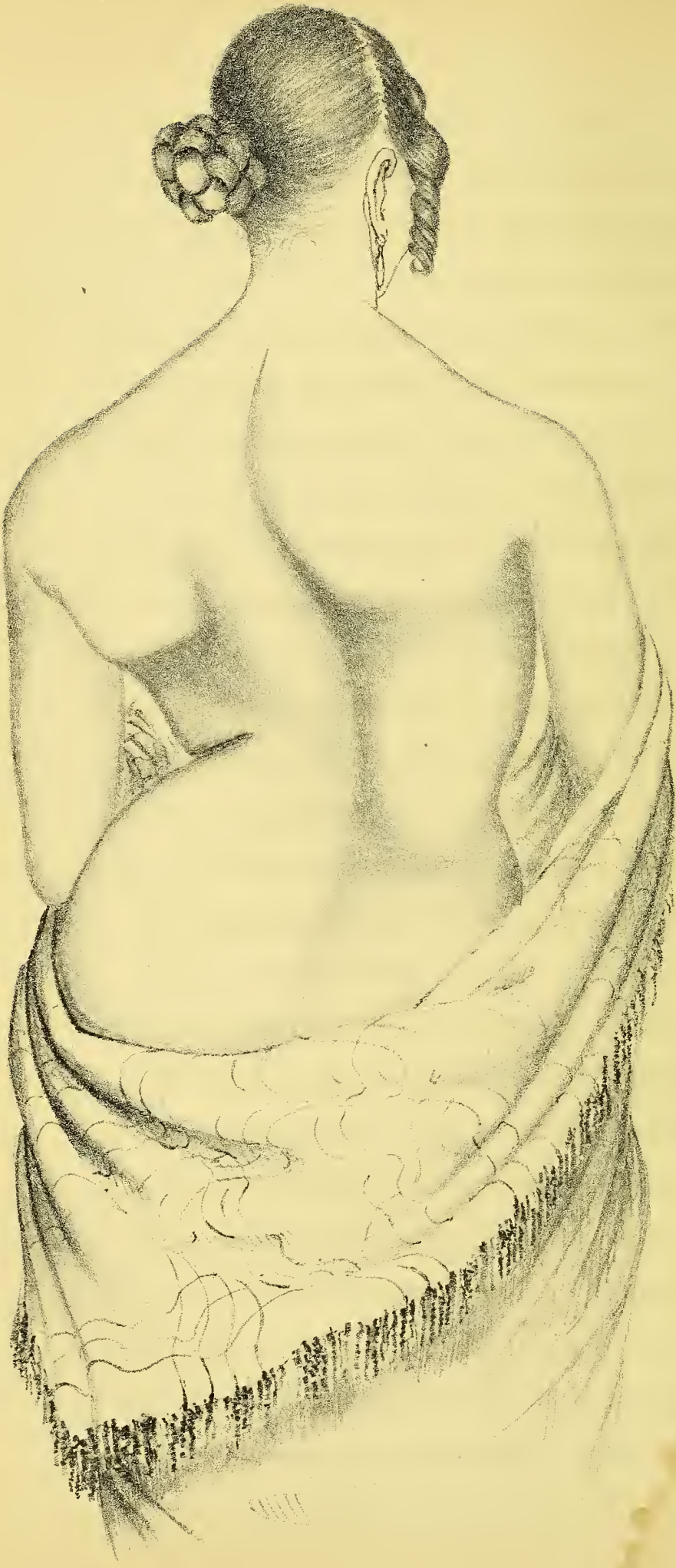
This condition of the muscles is more frequently met with amongst children than adults, commencing at a very early age. It is not at all an uncommon cause of spinal distortion about the age of three or four, and in fact earlier. I have a little patient under my treatment at this moment, of the name of Snell, with whom symptoms of lateral curvature began to show themselves about three years since, when she was but twelve months old. In this case the shortening of the lumbar muscles below the convexity of the curve is very evident.

Secondly, *The continued application of artificial weights.*—In tracing to their origin many of the worst cases of spinal distortion amongst adults, we shall find that this is a most frequent cause, particularly if the curvature has commenced after the tenth or twelfth year.

What I wish to be understood by this is, *an undue application of weight on one side*, by which the trunk is forcibly bent down laterally, and the spine thrown out in the opposite direction. Many occupations of life have a tendency to produce this: thus, it may be met with amongst nursery-maids, and all those who are in the habit of carrying heavy weights on one shoulder or in one hand.

So many accidental circumstances are connected with this cause, that it will be impossible to arrange





them under any distinct classification: suffice it to say, that amongst adults, in nine cases out of ten, this will be found the most frequent amongst the remote causes of lateral curvature.

The annexed plate represents the case of a girl I lately operated on, in whom the curvature was produced by affording support with the left shoulder to an aunt who was lame.

This case has been most gratifying in its results. In less than a week after the operation, the lumbar curve had disappeared; the left side was raised full two inches, and the folds of integuments had disappeared. So rapid an improvement surprised not only myself, but the patient's friends, as no plan of treatment had as yet been adopted, with the exception of keeping her in the prone position. The following are the particulars of the case:—

MARY ELIZABETH HOUGHTON, æt. 18, was admitted under my care August 3d, 1840, for lateral curvature of the spine. On examining the spine, I found a curvature occupying the middle of the back, with the convexity towards the right side, commencing from the fourth or fifth dorsal vertebra, and extending to the lower portion of the back. The lumbar vertebræ appeared to incline obliquely from above downwards, towards the left side, without much apparent curvature. The left side, as will be seen by the plate, was

contracted, and the integument on the hip thrown into folds. The hip itself was thrown out, occasioning a most perceptible and marked deformity. The whole of the right side was fuller than ordinary, the lower ribs inclining towards the crest of the ilium. Both shoulders were on a line with each other; a circumstance easily accounted for, on referring to the plate, and examining attentively the state of the ribs on either side. The lumbar muscles could be readily traced, passing from their origin to the convexity of the curve, tense and rigid, whilst those on the opposite side, even by the most attentive manipulation, could scarcely be felt. Her occupations were sedentary. Her friends attributed the deformity to a close attendance on an invalid aunt, who, in walking, always supported herself on her left shoulder. This was commenced when she was eight years old. By extending the spine, I found the curve could be considerably diminished in extent; the patient at the same time complained of a dragging sensation in the right lumbar region. I should remark, that she had been occasionally troubled with a pricking and shooting sensation in the muscles of this region.

On Wednesday, January 6th, she underwent the operation, in the presence of my friend Mr. White, whose kind assistance on this and other similar occasions I take this opportunity of acknowledging.

The operation occupied less than half a minute in its completion, and the patient walked to her bed, refusing any assistance. In less than a week the wound had, to all appearances, healed. Up to this present time she has not had a bad symptom. The operation has already proved an inestimable blessing to her; and, I doubt not, in a short time she will be perfectly restored to her natural figure.

GEORGE COOK, æt. 16, was admitted under my care in June last, affected with lateral curvature of the spine, of four years standing, the convexity of which was towards the *left* side. The curve extended from about the fifth to the tenth or eleventh dorsal vertebra, forming a perfect bend about the centre of the back. There was considerable excurvation of the ribs on the left side, which assumed much the same appearances as in the former case. The left shoulder was slightly elevated, and the right hip projected; the chest had under one great alteration in shape; and the functions of the lungs and heart were impaired. The sacro-costalis and longissimus dorsi muscles on the *concave* side were greatly enlarged, and were seen passing from their origin to the centre of the curve,—evidently counteracting agents to any further deviation of the spinal column, and which, from thus acting, had suffered considerable enlargement. The lumbar vertebræ had not suffered

displacement.* These muscles on the convex side were shortened, and were evidently the agents which retained the spine in its abnormal situation. He had been continually in the habit of carrying heavy weights in his left hand. *Vide Plate.*

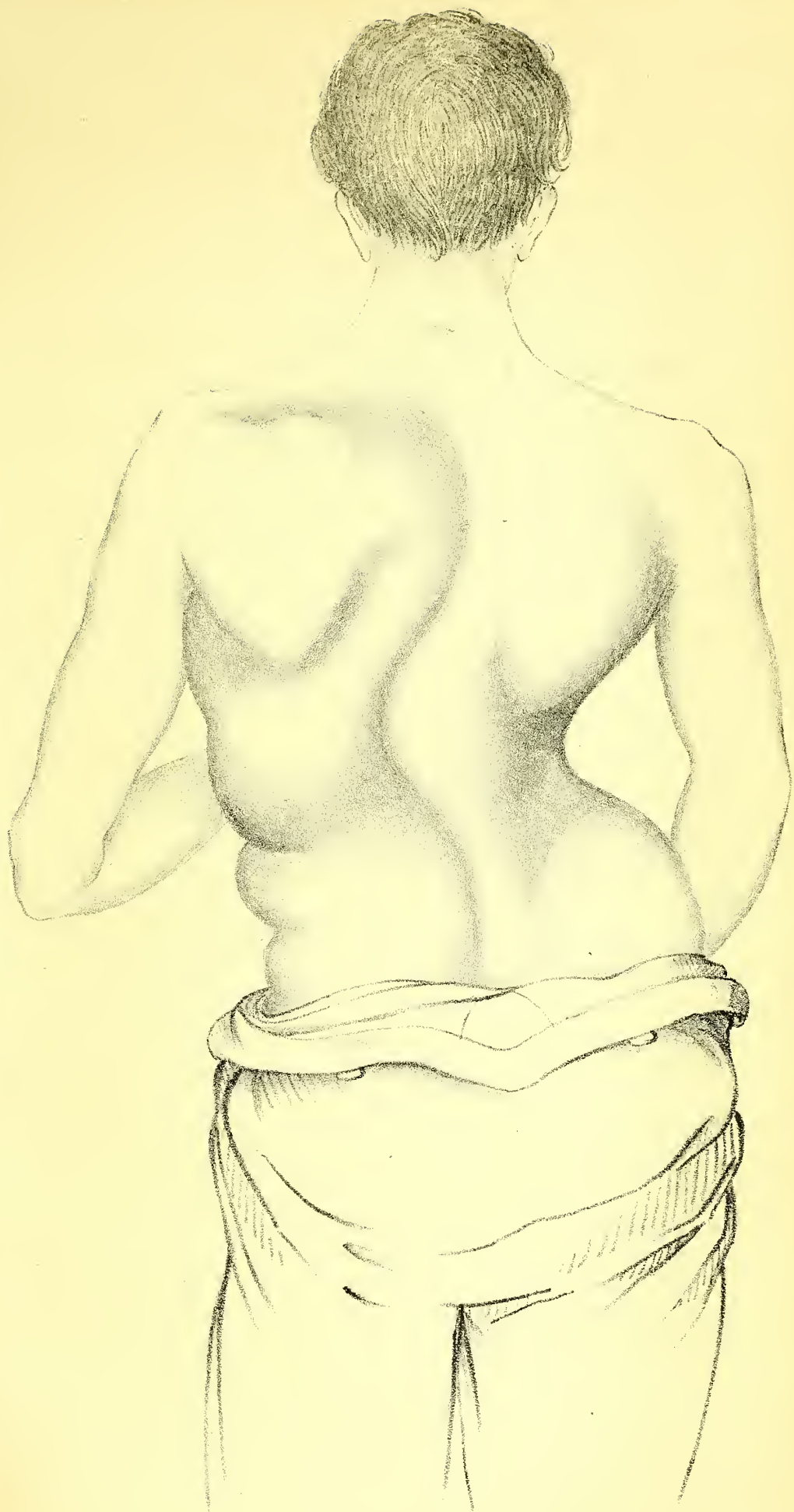
This lad has derived great benefit from the operation. The vertebræ above have gradually regained their natural situations; the right side is becoming fuller; the hollow at the hip has quite disappeared; and the traces of deformity in the back are now but slight. He still progressively improves.

According to our arrangement of the remote causes of lateral curvature, we come now to speak—

Thirdly, *of certain bad habits, acquired either in the sitting or standing posture, occasioning a loss of the natural balance of the body.*

For more particular information on this subject I must refer my readers to my work “On the Improvement and Preservation of the Female Figure,” in which it forms a separate section of itself. Mr. Bamfield, in allusion to this cause, observes, “I have seen instances of lateral curvature produced by a habit of long-continued inclination of the body to one side, after the adult age, in insane persons: in the young and growing this is a more common event. Young artists

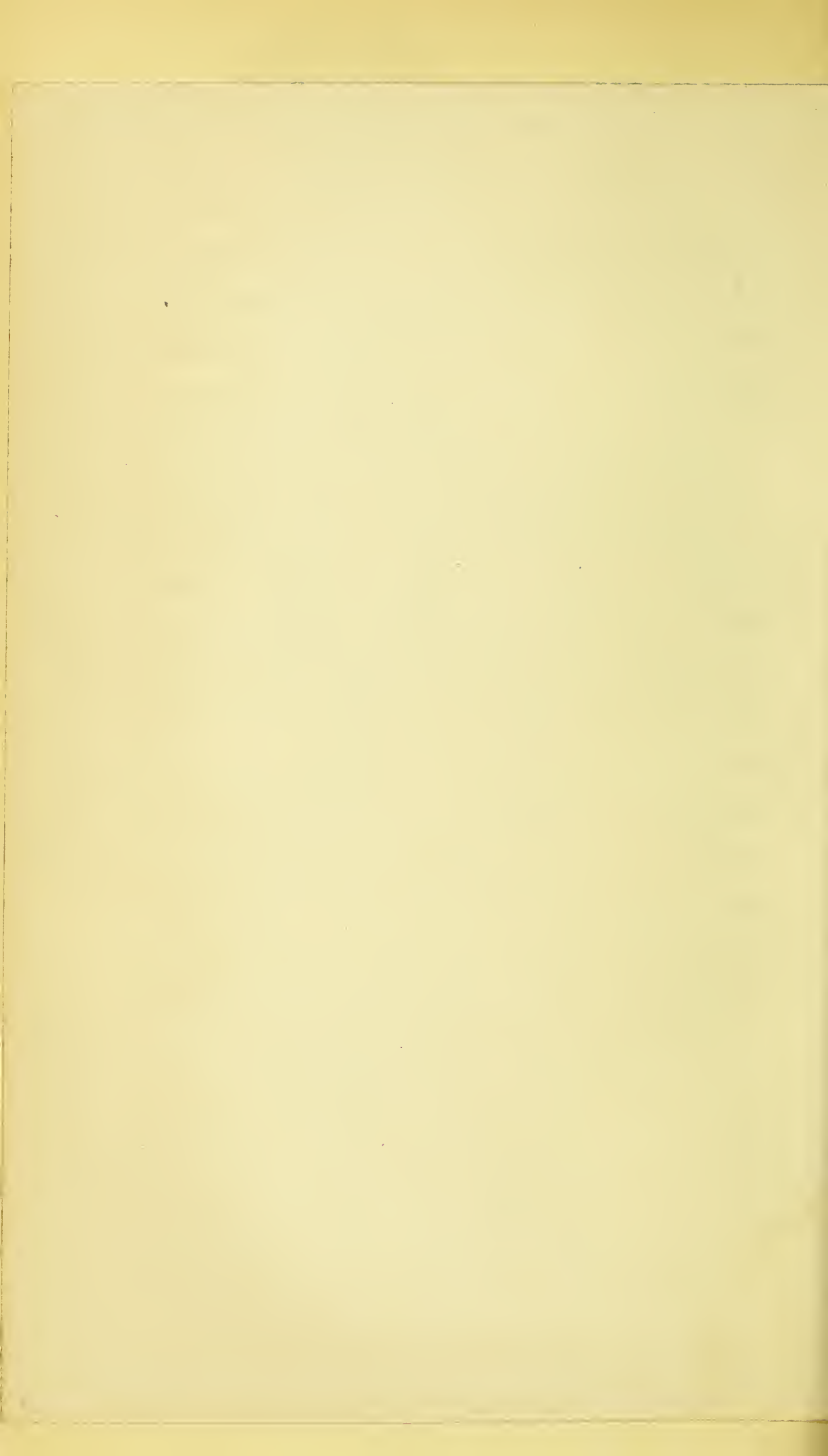
* This condition of the muscles on the concave side has been before alluded to.



CASE OF GEORGE COOK *Æt. 17.*

From life and on Stone by R.C. Bridges.

Printed by W. Lake, Lithog^r, 50, Old Bailey.



of both sexes are liable to lateral curvature from this cause, from adopting a habit of sitting before their paintings and drawings, with an inclination of the body to the left side, with the left arm resting on the elbow, or hanging by the side, sometimes with the palette in the left hand, whilst the right arm and shoulder are raised for the purpose of directing the pencil, and the head is directed to the left shoulder, and in this position the spine is kept in a state of lateral curvature for a long continuance of time. Some eminent artists in London are distorted from this cause.

“ Young ladies, and boys, who sleep two in a bed, are apt to lie always on the same side of the body in bed, and become liable to lateral curvature from this cause, as are all young persons who sleep constantly on one side, with the side of the head and shoulder resting on pillows, as in that position the spinal column is bent into a lateral curve. Young persons who always sit on the same side of a fire or window are also liable, by acquiring a habit of leaning on one side.”

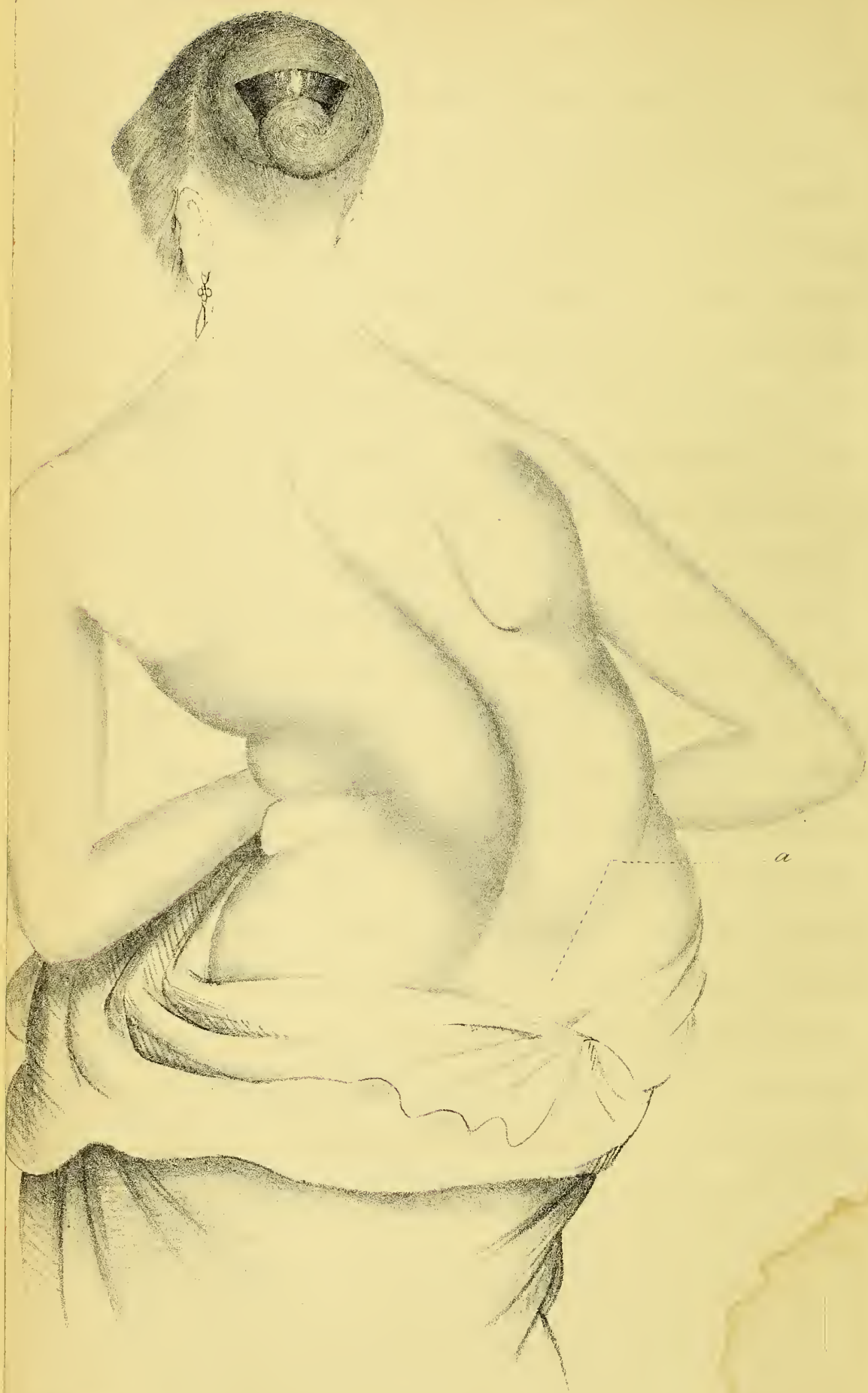
The following case is one of the most striking I have met with, of lateral curvature induced by this cause, and sufficiently exemplifies the extent of deformity these affections will occasion, if neglected or maltreated. I have not the least doubt, had this poor girl undergone proper treatment at the commence-

ment, she might have been spared many years of anxiety and misery.

SARAH MOTT, aged 24, affected with lateral curvature of ten years standing, applied to me for operation March 16th. The following, with some trifling alteration, is the girl's own history of her case:—

“ About the age of fourteen I was afflicted with a slight pain in my left side, which continued to increase. For about a month I did not seek any medical advice; but at the expiration of that period the pain was so acute, that my friends applied to a medical gentleman, by whose direction I underwent a long course of treatment, of cupping and blistering. About this time my parents perceived a slight lameness, and on examination my left leg was perceived to be drawn up, and much shorter than the other. My parents then applied to Mr. M'Donald, New Kent Road, under whose care I remained seven months without receiving any apparent benefit. Various forms of exercises were recommended me, such as swinging by the hands, &c. These I tried without success. I was subsequently admitted into Bartholomew's Hospital, under the care of Mr. Earle, where I remained four months *without being submitted to any plan of treatment*, at the expiration of which time I was discharged *as incurable!* I then applied to Sir Astley Cooper, who said nothing could be done for me, but that I must content myself





with wearing a support, which I have done ever since, but have been gradually getting worse.”

In consequence of the gastrodynia, she was in the habit of constantly leaning towards the left side, with her hand applied over the painful part, the only position which afforded her relief. Until lately she has always enjoyed good health, with the exception of this pain. She now at times experiences much difficulty of breathing, especially after any active exertion, and a considerable aggravation of her former symptoms. As will be seen by the annexed plate, the appearances of deformity were too striking to be overlooked. The left leg was full four inches shorter than the right, and, when standing on the right foot, the toes of the left scarcely touched the ground. The articulations of both extremities were quite sound, the apparent shortening of the limb being solely dependent on the displacement of the pelvis. The curvature will be seen involving all the vertebræ below the fourth dorsal, and directed towards the right side, gradually making a circular turn towards the left. The lower ribs on the right side are much projected, assuming the appearance of a large tumour, whilst those on the opposite are contracted, and in close contact with the brim of the pelvis. The dotted line, *a*, shews the situation of the erector spinæ muscle, which was found shortened from its origin to the convexity of the curve,

and exceedingly hard and unyielding to the touch, evidently a powerful agent in retaining the spine in its abnormal situation.

On placing the patient on my prone couch, and employing extension, the displaced vertebræ were made to approach much nearer to the mesial line of the back, and the appearance of deformity was sensibly diminished.

This girl underwent operation on Tuesday last, March 24th. I therefore can say nothing as to the result, three days only having elapsed up to the time of writing this. On cutting across the muscles, it offered great resistance to the knife, and for some depth appeared to be converted into a hardened tendinous structure. Mr. White, who kindly assisted me in the operation, whilst supporting the patient in front, stated that he could distinctly feel the incision to vibrate through the patient's body, as if something of a cartilaginous structure had been divided.

Whatever causes operate in producing lateral curvature, one condition of the lumbar muscles invariably follows, namely, a shortening of them, on one side, from their origin to the convexity of the curve. This shortening forms a powerful barrier to a reduction of the vertebræ to the spinal line of the back, and to overcome which without an operation requires the most vigilant and unceasing perseverance.

The following case, which I published in the Medical Gazette, of December 25th, will be interesting, inasmuch as it is one of those induced by the cause last mentioned, and which has already been greatly benefited by the operation, although of ten years standing.

“ My next case was a delicate female of six-and-twenty, who had been affected with lateral curvature of the spine ten years: her occupations were sedentary. She regards the curvature as a consequence of close application to a piece of embroidery she was anxious to complete when about 15 or 16 years of age. From the habit of sitting some hours at a time before the frame, with the right hand above and the left beneath, a lateral inclination was given to the spine, which in a very short time increased to the extent it was when she applied to me. On examining the back, I found the deviation to extend from the fifth cervical to the seventh dorsal vertebra on the right side, not in the form of a simple lateral curvature, but directed outwards and backwards, *posterolateral*. The ribs formed a most singular appearance, being flattened at the sides, with their angles projecting in the direction above mentioned, much in shape like a mower's scythe, whilst the points of the false ribs appeared almost protruding through the abdominal integuments. The spine below the seventh dorsal

vertebra was perfectly straight; the left side was much contracted, but scarcely any projection of the hips. By bending the body forwards, I could distinctly trace the sacro-costalis muscle stretched like a tense cord through its whole course, and the longissimus dorsi as far as the greatest point of convexity of the curve, was full and firm."

"The trapezius and rhomboid muscles of the left side differed materially from the preceding cases," [alluding to cases which had been mentioned] "for beyond the point alluded to scarcely any trace of muscular substance existed. The same appearances were exhibited on the left side as I have witnessed in the generality of these cases, and the muscles appeared thin and weak throughout their whole extent.

"Reflecting on this case, I found no difficulty in satisfying my mind as to the side on which the division of the muscles should be effected. The trapezius and rhomboid muscles had never been thrown into inordinate action, nor was it at all apparent that they had any influence in producing the curve.

"Although I operated on this case by the urgent request of the young lady, yet I did so with faint hopes of success, having taken into consideration the number of years it had been standing.

"I am happy to say, the results have far outstripped my expectations; the displaced vertebræ are gradually



moving towards the mesial line of the back ; the left side much less contracted, and the ribs no longer form that projection in front of the abdomen. She has increased an inch and a half in height since the operation." The accompanying plate shews the state of the back prior to the operation.

In the foregoing observations I have confined myself exclusively to those descriptions of curvature in which the operation is alone admissible. When the eye has once become acquainted with the different varieties of spinal distortion, these cases will be readily detected ; but to those who are uninitiated in the peculiarities of these affections, a much more attentive examination into their history and symptoms is necessary.

We must carefully discriminate between those cases which are induced by a carious disposition of the vertebræ, and those resulting from the causes already enumerated. This caution has been very properly adverted to by Mr. Tuson, in his recent work "On Curvature of the Spine." The diagnostic marks between the two affections are not so simple as might at first appear. Of course this remark is applicable only to their earlier stages ; for in the more advanced stages of curvature with caries the constitutional irritation, the intense pain, and occasional formation of abscesses, are sufficient indications

of the disease. The symptoms of curvature with caries are peculiar, according to the region in which the curve is situated. Thus, should it be commencing in the dorsal region, pain will be felt in this region, with occasional numbness of the arms, accompanied by a sensation of constriction about the epigastrium, and sometimes hiccough; if in the lumbar region, independent of the pain experienced, numbness and involuntary twitchings of the lower extremities, are the best characteristics of incipient disease.

Again, the operation, although not inadmissible in cases of long-standing curvature, should not be undertaken with too favourable impressions; nor are we to condemn it as altogether useless, should our anticipations not be realized. In these cases the vertebræ, from the length of time they have been displaced, have accommodated themselves to their new situations, and are become permanently fixed. I have succeeded with a case of many years standing, in lessening considerably the appearances of deformity, by rectifying the curve in the lumbar region, although the upper one remained, and even this latter was much diminished in extent.

The cases in which I have met with the most decided benefit, are those which come under the second division of our subject; and here my experience fully justifies me in ranking it amongst one of the greatest boons

conferred on society. The reason of this will be apparent when we reflect on the different powers of flexibility possessed by the dorsal and lumbar vertebrae. With these latter cases the curve will disappear within a week after the operation, and the appearance of deformity will be greatly lessened.

Prior to operating, the extent of mobility possessed by the spine should be ascertained, by raising the patient from off the ground, either by means of the hands (one being placed beneath the chin, and the other beneath the occiput), or else by means of an extension apparatus.

The plan I usually adopt is, to place the patient upon my extension couch, or to raise her by means of pulleys which I have fixed for this purpose. A cap should be provided made with strong webbing. One band must pass in a circular manner round the head, and fasten beneath the occiput with a buckle, whilst another of the same material should encircle the sides of the head and face, the chin being received into a hollow made for that purpose. Where these bands meet, on the vertex of the head, a strong loop must be attached, which, when extension is to be made, must be hooked into the cord which passes over the pulley, and in a very gentle manner the body is to be raised from off the ground.

If by any of these means the spine is observed

to move towards the mesial line of the back, the operation may be undertaken with every prospect of success; but if, on the other hand, the spine appears rigid, and betrays no symptoms of mobility, we must be wary in raising hopes that can never be realized, by submitting the patient to an useless, although *simple*, operation.

In the treatment of lateral curvature of the spine under our present notice, there are three points to be considered: first, to release the spine from the power which retains it in its abnormal situation; second, to restore the vertebræ to the spinal line of the back; and third, to prevent these bones from again relapsing into their unnatural situations.

The first of these is attained by a very simple operation, namely, a division of the contracted muscles.

There are two modes of effecting this division. Thus, for that description of curvature which comes under the first division of our subject, in which the trapezius and rhomboid muscles have suffered from inordinate action, their division must be effected in the following manner:—

The patient being placed in the prone position, with the chest elevated, and head hanging over a table, tension of the trapezius and rhomboid muscles must be made, by drawing the affected shoulder upwards and outwards. A straight, narrow bistoury, of sufficient

length, is then to be introduced, at a point corresponding with the greatest convexity of the curve, and to be passed carefully upwards, with its flat surface between the skin and posterior surface of the muscles, and as close as possible to the spine, until it has reached to about the superior angle of the scapula; by a semi-turn of the handle, its cutting edge will then be brought in contact with the trapezius muscle; it is then to be withdrawn, care being taken that a complete section of the trapezius and rhomboid be made close to the spinous processes of the vertebræ. By observing this latter direction, we shall avoid much loss of blood. Having completed this section, the bistoury must be again introduced into the same opening, and carried downwards in a similar manner, withdrawing it as before, and taking care that every portion of these muscles be separated from their spinal attachment.

In the above operation there need be no apprehension of hæmorrhage, as the only artery of magnitude traversing these muscles is the posterior scapular, which, if proper precaution be used, need never be wounded. This artery lies close to the base of the scapula.

For those cases which come under the second division of our subject, the operation is, if possible, still more simple. For these a transverse section of the lumbar muscles is to be made, and on the side corresponding with the convexity of the dorsal curve. The wound

need not be more than a quarter of an inch in depth, the most important point being to insure a complete division of the vertebral aponeurosis. The operation may be accomplished in less than thirty seconds, with the most trifling loss of blood, and the patient, if possessing moderate courage, complains but of little pain, and is enabled to walk to bed.

The operation may be performed in the following manner. The patient being directed to bend forward, a straight narrow bistoury must be passed between the skin and vertebral aponeurosis, on a line with the first lumbar vertebra, and carried forwards until it reaches the spinous process, slightly elevating the handle; it is then to be withdrawn, taking care that the wound is carried to the depth above mentioned, and insuring a free division of the aponeurosis. A retraction of the muscles immediately takes place, leaving a space of at least half an inch between the divided surfaces. A small piece of adhesive plaister must be placed over the external wound, which need not be more than the eighth of an inch in extent, and a compress applied, well secured by means of a roller. The patient should then be placed upon a hard mattress on the face, and kept in this position for three or four days. The wound will generally heal in less than a week, and no further inconvenience will be felt.

The operation will, of itself, remove the lumbar curve

when present, without any further interference ; but as far as the dorsal curve is concerned, although it will be considerably diminished, yet it must only be regarded as one important step towards a permanent cure.

The patient being allowed to rest about a week subsequent to the operation, we must then have recourse to such means as will assist nature in replacing the distorted vertebræ.

The position in which the patient lies should be our first consideration. After the time above specified the prone position should be changed, and a folded pillow placed in apposition with the dorsal curve, and in such a manner that the patient lying on the side, with the upper and lower portions of the trunk bending over it, the intercostal muscles on the opposite side are kept upon the stretch, and the ribs separated from each other. The patient should then be induced to grasp with the left hand a rope suspended from the ceiling, and at such a distance from the body as to keep the rhomboid and trapezius on the stretch, and at the same time endeavour to bring the arm to the side. By this latter movement, these muscles are thrown into a state of activity. This should be repeated frequently during the day.

Extension.—There are various means employed for effecting this most desirable end ; the most simple of which is the cap and pulley, already alluded to, the patient being in the erect attitude. Or extension may be

made whilst the patient is in the prone position, the head being fixed, whilst cords, attached to a circular band round the hips, pass over pulleys screwed into a board at the foot of the bed.

The most convenient form of extension will be that which is produced by my extension couch; the great advantage of which is, that the force acts in a gradual manner, whilst the extension may be permanent without producing any pain or inconvenience to the patient.* During extension, pressure is to be made by the hand on every projecting part; and in doing this, we must follow the action of respiration. The spinous processes of the displaced vertebræ should be gently directed towards the mesial line of the back by careful manipulation.

Should the ribs be involved in the projection, the utmost care and attention must be bestowed on the manner and direction in which this pressure is employed; for by an unskilful management of the operation much mischief might occur.

The third indication will be fulfilled by friction along the back with some stimulating embrocation, and the judicious arrangement of well-regulated forms of exercise.

The patient should not be permitted to sit up nor walk about after the operation without wearing some kind of

* For plate and description of couch, see my work "On Lateral Curvature of the Spine."

support; and if great care in this one particular be not observed, much risk will be incurred of the spine again relapsing into its former situation.

Of all the spinal supports I have met with, I have found none so well adapted for this purpose as those which are made by Mrs. Merriott, of Wigmore Street. I have had occasion in a former publication to allude to this lady, whose tact and ingenuity in devising these forms of apparatus deserves the support both of the faculty and the public.

Mrs. Merriott has for some time past supplied my patients with her apparatus. They afford every requisite degree of support, without opposing or restricting the remedial efforts of Nature by confining the muscles and limiting their sphere of action.

Her supports for ladies are well deserving consideration. They can be worn without inconvenience, and are so concealed beneath the dress that the most scrupulous need not fear their detection. From those ladies who are in the habit of wearing them, I have received the most gratifying avowals of their comfort and ease.

The safety of subcutaneous division of muscles has been fully established by M. Guérin, of Paris. For the information of my readers, I subjoin an interesting article which appeared in the "*British and Foreign Medical Review*," No. 21, *January*, 1841.

“ In a letter addressed to the Academy of Sciences on the 31st of August, 1840, M. Guérin states, that on the 25th of that month he performed the section of forty-two tendons, muscles, or ligaments, to remedy a series of articular deformities of the trunk and limbs, caused by the active retraction of these muscles and ligaments. There were twenty-eight openings of the skin required. The following were the parts divided :—

The Trunk...	Pectoralis major	1
The Arms ...	{ On each side Biceps cubiti	2
	„ Pronator teres.....	2
	„ Extensor carpi radialis.....	2
	„ Flexor communis sublimis	2
	„ Palmaris brevis.....	2
The Fore-arms	{ Tendons of the Extensor carpi ulnaris on each side	2
	„ Palmaris longus and brevis.....	4
	„ Abductor pollicis	2
The Legs....	{ The sartorius on each side	2
	The biceps cruris	2
	The semi-membranosus.....	2
	The semi-tendinosus.....	2
	The rectus femoris.....	2
	Fascia lata.....	2
	External lateral ligaments of the knee.....	2
The Feet...	{ The tendo Achillis on each side.....	2
	The tibialis anticus	2
	The extensor communis	2
	The extensor proprius pollicis.....	2
	The peronei antici.....	2

“ The patient only experienced moderate pain or fatigue, and did not complain during the operation, which lasted an hour. An hour afterwards he was in a sound sleep. He was very tranquil the following night and day. No inflammatory accident supervened, and on the third day the twenty-eight wounds were completely cicatrized. The sections were made in the presence of many distinguished French and foreign surgeons.

“ M. Guérin holds, that he is not open to the charge of rashness, as he first established the absolute innocuousness of subcutaneous wounds by numerous experiments on animals, and then verified the same principle in man, by a series of operations, from the section of one muscle to that of a great number. He purposes to lay an account of his method of operating, with its definite results, before the Academy in a future memoir.”—*Gazette Medicale de Paris*, Sept. 5th, 1840.

Before closing my subject, I cannot but express a regret, that, ere this, some establishment has not been instituted for the reception of those unfortunate beings, who, deprived of the means of procuring for themselves a treatment adapted for their peculiar cases, are doomed to pass their lives neglected and uncared for. Goaded by a sense of their unhappy condition, by the taunts and jeers of those whose minds are unpolished by the refining powers of education, they become thoughtful and morose ;

bearing about them an impenetrable halo of dark and gloomy thoughts, through which no ray of light can pierce, no gleam of hope, to cheer them through the turbulent stream of life. Their society shunned, their opinions slighted, their views cramped, by the oppressive load under which they toil, their minds yield not to the elasticity and buoyancy of youth ; they participate not in the enjoyments of society or the cheering anticipations of domestic love. Their life to them is one cold dreary winter ; no summer's sun e'er comes to thaw the frigid ice, which firmly clasps their beating hearts. No smiling spring, with joyous buds that bursting into life impart new charms to all around, can e'er remove from them that one, that all-absorbing grief. Friends who in their earlier life had felt some kindred tie of love, have one by one dropped silent to the grave, and they alone are left, without one social tie to cheer or raise their drooping hearts, but pass through life without a hope, unloving and unloved.

THE END.